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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/539,254	06/16/2005	Shoji Miyake	123612	2416

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EXAMINER	
KACKAR, RAM N	
ART UNIT	**PAPER NUMBER**
1763	

MAIL DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/539,254	MIYAKE ET AL.	
	Examiner	Art Unit	
	Ram N. Kackar	1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 June 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-37* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-37* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *various*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 8-10 and 29-31 are rejected under 35 U.S.C. 112, first paragraph, as based on a disclosure, which is not enabling. These claims are directed to aspect ration of the antennas, which according to the specification applies to rectangular antennas of the type disclosed in Fig 11. The limitations that these antennas are of this type is critical or essential to the practice of the invention, but not included in the claim(s) is not enabled by the disclosure. See *In re Mayhew*, 527 F.2d 1229, 188 USPQ 356 (CCPA 1976). Therefore this limitation must be included in either independent claims 1 or 26 or dependent claims 8 or 29.

3. Claim 20 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. In this claim a capacitor located in proximity to an antenna is disclosed to detect voltage applied to the antenna. This is not explained in the disclosure. Since one of ordinary skill in the art will not understand this, it is necessary that it be explained by the disclosure.

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claim 7 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 7 recites the limitation "the groups" in line 3. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 1-3, 11-14, 16, 23-26, 32-34 and 36-37 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Masaji et al (JP 2001-035697).

Masaji et al disclose a plasma generator for a vacuum chamber (Abstract), a stage (Fig 1-4) to hold a substrate (base plate) and multiple RF antennas attached to sidewalls arranged parallel to the stage (Fig 11). Although the length of conductor is not disclosed it can be fairly estimated from the size of the vacuum housing and the frequency applied (13.54 MHz- $\lambda/4$ = 5.5m) that it is much less than $\lambda/4$. The antenna are connected in parallel.

8. Claims 1-3, 7, 11-14, 16, 18, 24-26 and 32-37 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Yamakoshi et al (US 2001/0021422).

Yamakoshi et al disclose a plasma generator for a vacuum chamber (Abstract), a stage (Fig 29) to hold a substrate (base plate) and multiple RF antennas attached to sidewalls arranged parallel to the stage (Fig 29, 30 and paragraph 141). Although the length of conductor is not disclosed it can be fairly estimated from the size of the vacuum housing and the frequency applied (13.54 MHz- $\lambda/4$ = 5.5m) that it is much less than $\lambda/4$. The antenna are connected in parallel. Yamakoshi et al further teach phase detectors and phase shifters (phase matcher) and power meters for regulating the phases of RF power supplied to the antennas (electrode) and impedance matching circuits controlled by controller.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. Claims 4-6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Masaji et al (JP 2001-035697) in view of Koji et al (JP 2000-073174).

Masaji et al disclose a plasma generator for a vacuum chamber (Abstract), a stage (Fig 1-4) to hold a substrate (base plate) and multiple RF antennas attached to side walls arranged parallel to the stage (Fig 11). The antenna are connected in parallel.

Masaji et al however do not disclose that they are connected through a conductive plate.

Koji et al disclose the plurality of antennas connected in parallel being connected through plate like conductors (Fig 2)

Since plate like conductors can provide secure connections at required distance (important since that may introduce some phase shift) it would be obvious for one of ordinary skill in the art at the time of invention to use plate like conductors for parallel connections.

Regarding claim 5 in Masaji et al as modified by Koji et al the distances between connection points on the plate conductor would be less than $\lambda/4$ by the same reasoning as discussed above with respect to antenna length in claim 3.

11. Claim 5-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Masaji et al (JP 2001-035697) in view of Koji et al (JP 2000-073174) as applied to claim 4 and further in view of Kojin Nakagawa (JP 08325759).

Regarding these claims the distance between the points of connection is recommended to be smaller than $\lambda/4$ by Kojin Nakagawa (Abstract).

12. Claim 15-16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Masaji et al (JP 2001-035697) in view of Minoru Kanda (JP 2002-260899).

Masaji et al disclose a plasma generator for a vacuum chamber where plurality of antennas are connected in parallel to one power supply and do not disclose each antenna connected to a separate power supply.

Minoru Kanda discloses similar arrangement of plurality of antennas but connected to individual power supplies (abstract and Fig 5).

Since this arrangement allows individual control of power and phase shifts it is more flexible and easily controllable and its implementation in Masaji et al would have been obvious to one of ordinary skill in the art at the time of invention.

13. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Masaji et al (JP 2001-035697) in view of Choi et al (US 2002/0023718).

Masaji et al do not explicitly disclose that the variable impedance could be a variable inductance coil.

Choi et al disclose use of both variable capacitor and inductor for impedance matching.

Therefore having a variable inductance coil would have been obvious to one of ordinary skill in the art at the time of invention.

14. Claims 19 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Masaji et al (JP 2001-035697) or Yamakoshi et al (US 2001/0021422) in view of Nakamura et al (JP 2001094485).

Yamakoshi et al do not disclose pickup coil and bridge rectifier to measure power.

Nakamura et al disclose a pick-up coil and a rectifier to convert to DC disposed proximately to an antenna (Abstract and Fig 3).

Therefore it would have been obvious for one of ordinary skill in the art to measure power in the way taught by Nakamura et al in order to be able to control it precisely in the apparatus of Yamakoshi et al.

15. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Masaji et al (JP 2001-035697) or Yamakoshi et al (US 2001/0021422) in view of Koji Oku (JP 08162291).

Yamakoshi et al do not disclose a mixer for voltage and current signals to measure power.

Koji Oku disclose a high-frequency power source (Fig 1-10) comprising a matching box (30) and a power detection circuit (40), wherein the power detection circuit comprises a low pass filter (47) for conducting frequency mixing in double balanced mixers (46a, b) and removing the high-frequency components from the output of the double balanced mixers using local oscillator (45) and further low pass filter (49). Therefore power detection circuit converts the frequency of the high-frequency power to a low frequency and conducts detection based on the low-frequency power. Further the detected signal is used as negative feedback for control of high frequency power (Abstract and Fig 2).

Therefore it would have been obvious for one of ordinary skill in the art to measure power in the way taught by Koji Oku in order to be able to control it precisely in the apparatus of Yamakoshi et al.

16. Claims 27-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Masaji et al (JP 2001-035697) or Yamakoshi et al (US 2001/0021422) in view of Kojin Nakagawa (JP 08325759).

Yamakoshi et al do not explicitly disclose controlling plasma by regulating antenna length.

Kojin Nakagawa discusses the relationship of length vs. wavelength/frequency and uniformity (Paragraph 7-10 and 34-35).

Therefore regulating the length to get maximum uniformity would be obvious to one of ordinary skill in the art at the time of invention.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ram N. Kackar whose telephone number is 571 272 1436. The examiner can normally be reached on M-F 8:00 A.M to 5:P.M.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on 571 272 1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Ram

Ram Kackar
Primary Examiner AU 1763